

# AN ASSESSMENT OF SOME FORAGE CROPS IN SOUTH CANTERBURY

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## ABSTRACT

Three trials are reported. Dry matter production of two marrowstem kale cultivars, Giant and Medium-stemmed was compared with that from a hybrid kale, Maris Kestrel, sown on 4 October, 24 October, and 16 December.

Rangi rape and Wairoa brassica were compared when sown on the same three dates, with two fodder radish cultivars, Nerys and Rodric being included for the later two sowings.

The trials were sampled at monthly intervals over the period December 1974 to June 1975 and dry matter contents determined.

Giant was generally the highest yielding kale cultivar with Medium-stemmed and Maris Kestrel being comparable.

Rangi rape consistently outyielded Wairoa brassica although the differences were not significant. The fodder radish cultivars, in particular Nerys, showed a capacity for making exceedingly rapid growth.

Nerys and Rodric fodder radish were both sown at 5 and 10 kg/ha and 5 kg/ha proved satisfactory for both cultivars.

## INTRODUCTION

In Canterbury pasture growth is frequently limited by summer drought and by low soil temperatures in winter months. Consequently it is common practice to cultivate forage crops for feeding *in situ* to livestock in the late summer and winter months. Each year a significant percentage of arable soils in Canterbury are sown in summer and winter forage crops.

In the experiments described here the performances of several forage crops were compared. The superiority of hybrid kales with regard to feeding value is well recognised overseas (Anon, 1973 and Toosey, 1972). One hybrid cultivar was compared with two New Zealand standards and the pattern of dry matter accumulation recorded.

Wairoa brassica a native swede-rape cross from the Otago peninsula (Butel, pers. comm.) has enjoyed considerable success as a summer forage in the eastern North Island and some demand has appeared in the South Island. This crop was compared with Rangi rape to determine its suitability for South Island conditions.

Fodder radish is a relatively recent forage crop to New Zealand, on which little data has been published. The feeding value and rapid growth rate of the crop is well recognised overseas (Toosey, 1972 and Anon, 1973). Two recently introduced cultivars were grown to ascertain their value under New Zealand conditions.

## MATERIALS AND METHODS

Three trials are reported. All were carried out on a Waimakariri silt loam at Seadown, Timaru during 1974/75. Trifluralin (at standard commercial rates) was soil incorporated for weed control prior to sowing.

### Experiment 1

Two cultivars of marrowstem kale, Giant and Medium-stemmed were compared with a hybrid marrowstem kale, Maris Kestrel (all *Brassica oleracea*, L.) when sown on three dates (see Table 1) at a seed rate of 3 kg/ha.

Monthly harvests were carried out to crop maturity from December 1974 to June 1975. Individual plots were harvested at each sampling date. Each plot consisted of 10 rows, 12 cm apart and 12 m long, included in a randomised block design with three replicates.

At each sampling date, all the plants in an area of 1m<sup>2</sup> within the plots were cut at ground level. The plants were separated into leaf and stem and samples of each were taken for dry matter determination.

### Experiment 2

Rangi rape (*Brassica napus*, L.) was compared with Wairoa brassica (*Brassica sp.*) when sown on the same three dates as Experiment 1 with two fodder radish cultivars, Nerys and Rodric (*Raphanus sativus*, L.) included for the two later sowings (Table 3). Sowing rates were: Rangi rape 3 kg/ha, Wairoa brassica 2.25 kg/ha and fodder radish cultivars 5 kg/ha.

Plot size, randomisation and sampling technique were as for Experiment 1, except that the fodder radish cultivars were separated into leaf and bulb for dry matter determination.

### Experiment 3

The two fodder radish cultivars, Nerys and Rodric were compared at two seeding rates, 5 and 10 kg/ha. The design was a randomised block with three replicates. Each plot was 12 m long of 10 rows 12 cm apart. The trial was sown on 16 December 1974.

At maturity an area of 1m<sup>2</sup> was harvested from each plot by cutting all the plant material at ground level. The plants were separated into leaf and bulb and samples of each taken for dry matter determination.

## RESULTS

### Experiment 1

Yields of the three kale cultivars are shown in Table 1.

Maris Kestrel exhibited more rapid establishment than the other cultivars, and gave a significantly greater yield at the first cut from two of the sowing dates. Subsequently Maris Kestrel was comparable to Medium-stemmed, with both showing a slight advantage (non-significant) over Giant up to about 4 months after sowing. At 5 to 6 months after sowing Giant was generally more productive.

About 6 months after sowing stems of Giant and Medium-stemmed in particular showed a tendency to become very woody. This was not noticeable in Maris Kestrel.

Percentage contribution of leaf to total dry matter for all cultivars at each sowing date is shown in Table 2.

Contribution of leaf followed a downwards trend from the first to final sample, with that for Giant being consistently lower than the two other cultivars.

#### Experiment 2

Yields of the four crops grown are shown in Table 3.

For rate of growth Nerys fodder radish was significantly better than the brassicas from both sowings and Rodric significantly better from the early sowing. Both fodder radish cultivars reached maturity some 7 to 9 weeks after sowing, after which flowering commenced.

Rangi rape was consistently better than Wairoa

brassica at all sampling dates from all sowings, although in no case was this difference significant. Both brassica species tended to reach a peak some 4 months after sowing. With early sowing (4 October) both brassicas remained at this peak production level over a period of 2 months, however with later sowings production fell off rapidly once the maximum level had been reached.

#### Experiment 3

The yields of the various components at each sowing rate for the two fodder radish cultivars are shown in Table 4.

TABLE 1: Mean dry matter yields (kg/ha) of three kale cultivars from three sowing dates

Sowing date	Cultivar	20.12.74	23.1.75	20.2.75	3.4.75	6.5.75	9.6.75
4.10.74	Maris Kestrel	1395 a	3465 a	4795 a	7880 a		
	Medium-Stemmed	865 b	2575 ab	4860 a	8285 a		
	Giant	315 c	1620 b	3775 a	6885 a		
24.10.74	Marris Kestrel	1120 a	3483 a	6610 a	9620 ab	7570 b	
	Medium-Stemmed	935 a	3505 a	6025 a	7695 b	7185 b	
	Giant	560 b	2935 a	5870 a	10275 a	10335 a	
16.12.74	Maris Kestrel			3065 a	4995 a	7835 ab	9600 a
	Medium-Stemmed			1490 b	4220 a	4445 b	9860 a
	Giant			1295 b	4120 a	9380 a	10280 a

TABLE 2: Mean leaf dry matter percentage contribution to total yield/sampling date

Sowing date	Cultivar	23.1.75	20.2.75	Harvest date 3.4.75	6.5.75	9.6.75
4.10.74	Maris Kestrel	83 a	71 a	56 a		
	Medium-Stemmed	74 b	57 b	45 b		
	Giant	72 b	49 b	43 b		
24.10.74	Maris Kestrel	84 a	58 a	46 a	38 a	
	Medium-Stemmed	66 c	53 b	49 a	40 a	
	Giant	76 b	50 b	43 a	31 b	
16.12.74	Maris Kestrel			70 a	50 a	41 a
	Medium-Stemmed			67 a	53 a	44 a
	Giant			55 b	44 b	34 b

TABLE 3: Mean dry matter yield (kg/ha) of two forage brassica cultivars and two fodder radish cultivars from three sowing dates

Sowing date	Cultivar	20.12.74	23.1.75	Harvest date 20.2.75	3.4.75	6.5.75
4.10.74	Rangi rape	3545 a	5455 a	5645 a	5930 a	
	Wairoa brassica		2365 a			
	Wairoa brassica	2365 a	3098 a	3120 a	3570 a	
24.10.74	Rangi rape	2310 b	4973 a	5940 a	4584 a	
	Wairoa brassica	1900 b	4090 a	4890 b	3668 a	
	Nerys fodder radish	3235 a				
	Rodric fodder radish	2890 a				
16.12.74	Rangi rape			3760 b	5967 a	5297 a
	Wairoa brassica			2755 b	4687 a	5971 a
	Nerys fodder radish			5365 a		
	Rodric fodder radish			3785 b		

No significant difference occurred.

Both cultivars reached maturity at the same time for both sowing rates. It was noticeable however that bulbs were small for both cultivars when sown at 10 kg/ha. Further a definite trend was apparent with the contribution by bulbs to total dry matter declining by 8-9% at high sowing rates for both cultivars.

Nerys showed a trend to decline in yield at the high seeding rate, while Rodric showed an increased yield at the high sowing rate (non-significant).

Rodric 10 kg/ha although differences were not significant. Economically this would favour Nerys. However if the seedbed was weedy or if direct drilling of seed into pasture was carried out it may be advantageous to increase seeding rate to 10 kg/ha to ensure rapid ground cover.

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TABLE 4: Mean dry matter yields (kg/ha) of two fodder radish cultivars at two sowing rates 1974/75.

Cultivar	Sowing rate kg/ha	Leaf	Bulb	Total
Nerys	5	4283 a	1021 a	5304 a
Nerys	10	4116 a	456 a	4572 a
Rodric	5	3125 a	1102 a	4227 a
Rodric	10	3847 a	846 a	4693 a

#### DISCUSSION

Kales produced dry matter yields comparable to those reported by Keenan (1971), Scott (1971) and Stephen (1974). The pattern of dry matter accumulation and the percentage contribution of leaf to total dry matter yields are similar to that reported by Stephen (1974). Furthermore the results support Stephen (1974) in his view that high percentages of leaf indicate a short period of growth rather than climatic conditions unfavourable for stem growth.

Maris Kestrel gave yields at maturity comparable to Giant and Medium-stemmed kale, supporting the results reported by Stephen (1973). This cultivar was however quicker establishing as indicated by yields at early harvests, and had significantly greater percentages of leaf at early harvests.

The reported lack of stem fibre content and improved digestibility of Maris Kestrel (Anon, 1973) allied with satisfactory yield results would therefore suggest this cultivar to be suitable for cultivation in Canterbury and probably other areas of New Zealand also.

Despite its apparent success in the North Island, Wairoa brassica did not give satisfactory results in South Canterbury and was consistently outyielded by Rangi rape. While this is a recognised feature of Wairoa brassica it is also generally acknowledged that this crop has some advantages, in that it can be fed prior to maturity and does not appear to cause 'lamb scald' to the same extent as rape.

Both rape and Wairoa brassica showed a tendency to rapidly fall off in yield once maximum dry matter production had been reached, especially from later sowings.

The fodder radish cultivars exhibited exceptional growth rates as reported by Toosey (1972) and Anon (1973). With their accepted palatability (Toosey, 1972), and in the case of Nerys feeding value equivalent to rape Anon, 1973) fodder radish would definitely seem to have a place as a summer/autumn forage in Canterbury. The cultivar Nerys gave yields of dry matter after 8 weeks equivalent to that obtained from rape after 12 to 16 weeks. The rapid establishment of the crop would also tend to limit the effect of weed competition and perhaps water stress.

It appeared from Experiment 3 that Nerys fodder radish was better suited to a seeding rate of 5 kg/ha and

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